IN THE CLAIMS

1. (Previously Amended) A method of welding comprising the steps of:

providing a differential housing surface;

providing a blank surface;

generating heat from at least one of these surfaces at their interface sufficient to weld the surfaces together; and

applying the surfaces together.

2. (Original) The method of claim 1 wherein the heat is generated by electric discharge between the surfaces.

3. (Original) The method of claim 2 wherein the electric discharge results from creating an electric potential between the surfaces and moving the surfaces in proximity to each other to effect the electric discharge.

4. (Original) The method of claim 3 further including the step of moving the surfaces apart, creating another electric potential between the surfaces, moving the surfaces in proximity to each other to effect the electric discharge between the surfaces, and applying the surfaces together.

5. (Original) The method of claim 4 repeated until the surfaces are sufficiently welded together.

6. (Original) The method of claim 1 wherein the heat is generated by friction between the surfaces.

7. (Original) The method of claim 6 wherein the friction is created by moving one surface translationally relative to the other surface.

8. (Original) The method of claim 6 wherein the friction is created by moving one surface rotationally relative to the other surface.

9. (Previously Amended) The method of claim 1 wherein the differential housing surface is curved.

10. (Original) The method of claim 1 wherein the blank surface is a snorkel.

11-20. Cancelled.

Claim Rejections - 35 U.S.C. §103

In the Final Office Action mail April 18, 2003, the Examiner rejected claims 1-20. To narrow the issues for appeal, applicant has canceled claims 11-20. Claims 1-10 remain pending. The Examiner contends that each of these remaining claims is obvious in view of the cited references. Applicant disagrees with the basis for this rejection and requests allowance of Claims 1-10.

The Examiner rejected claims 1-3 and 9-10 pursuant to 35 U.S.C. §103(a) as being unpatentable over *Glaze, et al.* (U.S.P. 4,754,847) in view of *Danjou, et al.* (U.S.P. 5,442,977) and *Gale* (U.S.P. 1,323,178). The Examiner seeks to combine these three references, claiming the following:

> One would have been motivated to do so in order to provide a means of fastening the differential housing surface and the snorkel together by using welding as a fastening means, as taught by *Danjou, et al.* One would have been motivated to use the welding method taught by *Gale* as a specific welding means for fastening the parts and also as a welding means for fastening parts of different cross section, as taught by *Gale*. [Final Office Action (4/18/2003), p.3].

Accordingly, the sole motivation for combining the particular method of welding as taught by *Gale*, *Danjou, et al.* and *Glaze, et al.* rests on the Examiner's contention that there is in *Danjou, et al.* and *Glaze, et al.* a need to fasten parts of "different cross section, as taught by *Gale*." However, neither *Danjou, et al.* nor *Glaze* identifies welding parts of different cross sections as a problem. Indeed, in *Danjou, et al.*, the welded components are of similar size and cross section. It is thus not surprising that *Danjou, et al.* makes no mention of any problem encountered in the welding of its component that would support a motivation to seek the solution of *Gale*. Indeed, *Glaze et al.* simply fails even to mention welding. Thus, while *Gale* offers a particular solution for a particular

need, there is nothing within either of the references cited by the Examiner that suggests the need to combine the solution of *Gale* with the problems faced by *Danjou, et al.*, or, for that matter, *Glaze, et al.*

Moreover, the solution offered by *Gale* is old and, yet, there is no suggestion in *Glaze, et al.* or *Danjou et al.* of its teachings. If, in fact, this combination were obvious, one would anticipate some mention of this particular technique in *Glaze, et al.* or *Danjou et al.* The absence of such a suggestion supports the conclusion of nonobviousness. Therefore, claims 1-3 are allowable over the cited references.

The Examiner further rejected claims 9 and 10 in view of these foregoing references. Claim 9 requires that the differential housing to be curved while claim 10 requires that the blank surface to be a snorkel. Claim 9 thus requires that the differential housing surface to be welded must be curved. As acknowledged by the Examiner, *Glaze, et al.* fails to teach welding of any surface. *Danjou, et al.* fails to teach creating a weld at a curved surface as well. Indeed, the surfaces to be welded to each other in *Danjou, et al.* are all flat. Therefore, not only do the cited references fail to teach all the limitations of claim 9 but further teach a way from their combination with *Gale*, which teaches welding to a curved surface. Once again, the problems encountered by *Danjou, et al.* and *Glaze, et al.* are not relevant to the solution offered by *Gale*. Therefore, claim 9 is in condition for allowance.

Claim 10 requires that the blank surface to be welded is a snorkel. The snorkel of *Danjou, et al.*, however, is formed as a single piece with "cover **4**." There is therefore no need to weld the snorkel to the differential housing in *Danjou, et al.* Indeed, *Danjou, et al.* teaches away from welding by indicating that "the cover **4** is not welded, but mounted

firmly on the ring portion **2** via a plurality of bolts **9**." [*Danjou, et al.*, column 4, ll 52-53]. As further indicated by *Danjou, et al.*, this feature permits "cover **4**" to be detached for maintenance work on the differential gear mechanism. [*Danjou, et al.*, column 4, ll 56-59]. Because there is no need for welding of the snorkel to the differential housing in *Danjou, et al.*, or for that matter *Glaze, et al.*, there is no reason to combine its teachings with *Gale* to meet the limitations of claim 10. Therefore, claim 10 is separately allowable.

The Examiner rejected claims 4 and 5 pursuant to 35 U.S.C. §103(a) as being unpatentable over *Glaze, et al.* in view of *Danjou, et al.* and *Gale* and further in view of *Cox*. Claim 4 requires the step of "moving the surfaces apart, creating another electric potential between the surfaces, moving the surfaces in proximity to each other to effect the electric discharge between the surfaces, and applying the surfaces together." Claim 4, which depends upon claim 1, is allowable because claim 1 is in condition for allowance. In addition, claim 4 is allowable because *Cox* is improperly combined with the foregoing references. The Examiner contends that motivation exists to combine *Cox* with the teachings of the foregoing references because "One would have been motivated to do so in order to have provided a method of uniformally heating the surfaces to the welding temperature before fastening them together." Yet, neither *Danjou, et al.*, *Glaze, et al.*, nor *Gale* indicates difficulties with "uniformally heating the surfaces to the welding temperature before fastening them together." Accordingly, there would be no motivation to combine these references with *Cox*. Therefore, claim 4 is allowable. For this same reason, claim 5, which depends upon claim 4, is allowable as well.

The Examiner has rejected claims 1, 6 and 8-10 under 35 U.S.C. §103(a) as being unpatentable over *Glaze, et al.* in view of *Danjou, et al.* and *Larsen* (U.S.P. 4,552,609). The Examiner seeks to combine *Larsen* with *Glaze, et al.* and *Danjou, et al.*, claiming the following:

> One would have been motivated to do so in order to provide a means of fastening the differential housing surface and the snorkel together by using welding as a fastening means, as taught by *Danjou, et al.* One would have been motivated to use the welding method taught by *Larsen* as a specific welding means for fastening the parts and also for providing a welding method that is low in cost, is uniform, and allows welding up to similar metals, as *Larsen* teaches. [Final Office Action (4/18/2003), p.5].

Essentially, the Examiner argues that the benefits of low cost, uniform welding, and welding of dissimilar metals provides motivation for combining *Larsen* with the other references. Again, however, the Examiner fails to explain how the particular solution offered by *Larsen* would solve any problem encountered by *Glaze, et al.* and *Danjou, et al.* Both *Glaze, et al.* and *Danjou, et al.* are silent on the need for low cost, uniform welding and the need to weld dissimilar metals. Indeed, there is no indication in either *Danjou, et al.* or *Glaze, et al.* that any welding method is insufficient in any way. There is therefore no need for the particular solution offered by *Larsen* to solve any particular problem encountered by *Danjou, et al.* or *Glaze, et al.* Accordingly, the combination of *Glaze, et al.*, *Danjou, et al.* and *Larsen* is improper. Claims 1, 6 and 8-10 are allowable over these cited reference.

The Examiner rejected claims 1, 6, 7 and 9-10 under 35 U.S.C. §103(a) as unpatentable over *Glaze, et al.* in view of *Danjou, et al.* and *Brownell, et al.* (U.S.P. 6,095,402), *Walker, et al.* (U.S.P. 6,106,233), or *Mahoney, et al.* (U.S.P. 6,237,834). The Examiner provides the following basis for motivation to combine *Glaze, et al.* and

Danjou, et al. with the particular welding methods disclosed by *Brownell, et al., Walker, et al.* or *Mahoney, et al.*:

> One would have been motivated to use the welding methods taught by *Brownell, et al., Walker, et al.*, or *Maloney, et al.* as specific welding means for fastening the parts and also to use a welding method that provides reduces stress for the weld and prevents flash during welding, as *Walker, et al.* teach, to use a welding method that keeps the weld within a fillet radius, as *Brownell, et al.* teach, or to use a welding method that is precise, low in cost, and less labor intension, as *Mahoney, et al.* teach. [Final Office Action (4/18/03), p.7].

In so doing, the Examiner again fails to explain why the particular benefits of the specific methods of welding would satisfy any need identified in *Danjou, et al.* or *Brownell, et al.* Without such need, one of ordinary skill in the art would have no motivation to look beyond *Danjou, et al.* and *Glaze, et al.* for any specific method of welding. That is, there is no problem encountered by *Glaze, et al.* or *Danjou, et al.* with respect to welding that suggests the need for any particular method of welding. For example, the Examiner contends that the welding method of *Brownell, et al., Walker, et al.* or *Mahoney, et al.* provide the benefit of reduced stress for the weld and prevents flash during welding. Yet, nothing within *Danjou, et al.* or *Glaze, et al.* indicates these particular problems or a need to solve these particular problems. The Examiner simply presumes that these benefits would motivate one of ordinary skill in the art to combine the particular welding techniques of *Brownell, et al., Walker, et al.* or *Mahoney, et al.* with the structure of *Danjou, et al.* and *Glaze, et al.* Therefore, the combination of these references is improper. Claims 1, 6, 7 and 9-10 are allowable.

The Examiner rejected claims 1-3 under 35 U.S.C. §103(a) as being unpatentable over *Stewart, et al.* (U.S.P. 4,221,138) in view of *Gale* (U.S.P. 1,323,178). Here, the Examiner again attempts to marry the particular type of welding described by *Gale* to

blank surfaces comprising a differential housing. Again, however, the Examiner fails to identify sufficient motivation to combine these references. Indeed, the Examiner claims:

> One would have been motivated to use the welding method taught by *Gale* as a specific welding means for fastening the parts and also as a welding means for fastening parts of different cross section, as taught by *Gale*. [Final Office Action (4/18/03), p.8].

The Examiner apparently argues that one with the teachings of *Stewart, et al.* would be motivated to use the specific welding method taught by *Gale* because the method of *Gale* fastens parts and also fastens parts of different cross section. However, there is no indication that one of ordinary skill in the art with the teachings of *Stewart, et al.* would have any motivation for any particular type of welding. There is no indication in *Stewart, et al.* of the need for any particular type of welding process. Conversely, there is no indication in *Gale* that its teachings would benefit any problem encountered by *Stewart, et al.* The Examiner appears to claim that *Stewart, et al.* has parts of different cross section that would serve as motivation to combine its teachings with *Gale*. However, referring to Figure 5, the "channel shaped stamping **26**" has an almost identical cross section to "tube segment **20**." Therefore, there is no need and *Stewart, et al.* does not teach a particular method for welding of the pieces together. The combination of *Stewart, et al.* and *Gale* is improper. Claims 1-3 are allowable over these references.

Claims 4 and 5 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Stewart, et al.* in view of *Gale* and further in view of *Cox*. Again, nothing within *Stewart, et al.* indicates a need for a particular type of welding, especially the type of welding offered by *Cox*. The benefit of uniformally heating the surfaces to welding temperature before fastening the surfaces together offered by *Cox* do not satisfy any particular need

expressed by *Stewart, et al.* in the welding of differential housing surfaces. Therefore, claims 4, 5 are allowable over the cited reference.

Claims 1, 6, and 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Stewart, et al.* in view of *Larsen*. For much the same reason as stated before, *Stewart, et al.'s* combination with *Larsen* is improper. Specifically, there is no indication in *Stewart, et al.* of a need for the benefits of friction welding offered by *Larsen*. Indeed, as the Examiner notes, *Larsen* teaches the rotation of parts that are oblong and asymmetrical about a rotational axis to achieve friction welding. There is no enabling disclosure as to how the surfaces of *Stewart, et al.* would be rotated so as to achieve the friction welding of the surfaces. The Examiner's mere assertion that *Larsen* provides a welding method that is low in cost, uniform, and allows welding of dissimilar metals does not make *Larsen's* teachings relevant to the problem faced by *Stewart, et al.* Accordingly, the combination of these references is improper and claims 1, 6, and 8 are allowable.

Next, the Examiner rejects claims 1-3, and 9 under 35 U.S.C. §103(a) as being unpatentable over *Danjou, et al.* in view of *Gale*. It should be noted again that *Danjou, et al.* does not teach the welding of a curved differential housing surface to another blank surface. "Cover 4" of *Danjou, et al.* is flat and is, in fact, bolted to "ring portion 2." [*Danjou, et al.*, column 4, ll 53]. The remaining surfaces of *Danjou, et al.* that are welded are, in fact, not curved. Moreover, *Danjou, et al.* does not indicate a need for a particular type of welding or indicate that it would benefit from the welding offered by *Gale*. Therefore, the combination of these two references is improper. Claims 1-3, and 9 are allowable over these references.

Claims 4 and 5 were rejected under 35 U.S.C. 103(a) as unpatentable over *Danjou, et al.* in view of *Gale* and further in view of *Cox*. While *Gale* and *Cox* teach specific methods of welding, there is no indication in *Danjou, et al.* of a need for the type of welding taught by these references. Therefore, the combination and the rejection is improper.

The Examiner further rejected claims 1, 6, 8, and 9 under 35 U.S.C. §103(a) as unpatentable over *Danjou, et al.* in view of *Larsen*. The Examiner acknowledges that *Danjou, et al.* does not teach a specific welding method. Further, *Danjou, et al.* does not indicate any need for the benefits of the specific welding method taught by *Larsen*, i.e., low cost, uniform welding, and dissimilar metals. The Examiner merely presumes that these benefits would be desirable. There is, in fact, no indication in either reference that the benefits of *Larsen* would exist for *Danjou, et al.* Again, the combination is improper for lack of motivation. Claims 1, 6, 8, and 9 are allowable over these cited references.

The Examiner rejected claims 1, 6, 7, and 9 under 35 U.S.C. §103(a) as being unpatentable over *Danjou, et al.* in view of *Brownell, et al.*, *Walker, et al.* or *Mahoney, et al.* The Examiner notes that *Danjou, et al.* does not teach a specific welding method. While *Brownell, et al.*, *Walker, et al.*, and *Mahoney, et al.* all teach methods of fastening surfaces together by linear friction welding, there is no indication that the differential housing of *Danjou, et al.* would benefit from the particular type of welding offered by these references. The combination of these references is improper. Claims 1, 6, 7 and 9 are allowable over them.

Finally, the Examiner rejects claims 1 and 9-10 under 35 U.S.C. §103(a) as being unpatentable over Applicant's admitted prior art. As noted before, the heat from the prior

art is not generated by the surfaces but instead generated by the arc welder. The Examiner acknowledges as much in the Final Office Action. In contrast, whether by friction welding or by creating an electric potential between the surfaces, the inventive welding technique generates or creates heat between the surfaces. Therefore, claim 1 and 9-10 are allowable over the cited reference.

Respectfully submitted,

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CERTIFICATE OF FACSIMILE

I hereby certify that this correspondence is being facsimile transmitted to Examiner Kevin L. McHenry, Patent and Trademark Office (Fax No. (703) 872-9311) on. June 18, 2003.

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